Name:

at1118paper: Complete the Square (v414)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 56x = -780$$

Add $\left(\frac{-56}{2}\right)^2$, which equals 784, to both sides of the equation.

$$x^2 - 56x + 784 = 4$$

Factor the left side.

$$(x - 28)^2 = 4$$

Undo the squaring. We need to consider both $\pm\sqrt{4}$.

$$x - 28 = -2 \quad \text{or} \quad x - 28 = 2$$
$$x = -30 \quad \text{or} \quad x = -26$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 + 40x = -204$$

$$x^2 + 40x + 400 = 196$$
$$(x + 20)^2 = 196$$
$$x + 20 = \pm 14$$
$$x = -34 \quad \text{or} \quad x = -6$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 - 46x = 840$$

$$x^2 - 46x + 529 = 1369$$
$$(x - 23)^2 = 1369$$
$$x - 23 = \pm 37$$
$$x = -14 \quad \text{or} \quad x = 60$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 - 24x = -63$$

$$x^2 - 24x + 144 = 81$$
$$(x - 12)^2 = 81$$
$$x - 12 = \pm 9$$
$$x = 3 \quad \text{or} \quad x = 21$$

Question 4

By completing the square, find both solutions to the given equation:

$$x^2 - 38x = -240$$

$$x^2 - 38x + 361 = 121$$
$$(x - 19)^2 = 121$$
$$x - 19 = \pm 11$$
$$x = 8 \quad \text{or} \quad x = 30$$

Question 5

By completing the square, find both solutions to the given equation:

$$x^2 - 8x = 84$$

$$x^2 - 8x + 16 = 100$$
$$(x - 4)^2 = 100$$
$$x - 4 = \pm 10$$
$$x = -6 \quad \text{or} \quad x = 14$$

Question 6

By completing the square, find both solutions to the given equation:

$$x^2 - 58x = -792$$

$$x^2 - 58x + 841 = 49$$
$$(x - 29)^2 = 49$$
$$x - 29 = \pm 7$$
$$x = 22 \quad \text{or} \quad x = 36$$